



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
-----------------	-------------	----------------------	---------------------	------------------

10/089,025

06/21/2002

Anthony Hooley

KEM1.N.80540B

9464

3775 7590 12/09/2008  
ELMAN TECHNOLOGY LAW, P.C.  
P. O. BOX 209  
SWARTHMORE, PA 19081

EXAMINER

KURR, JASON RICHARD

ART UNIT

PAPER NUMBER

2614

MAIL DATE

DELIVERY MODE

12/09/2008

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/089,025	<b>Applicant(s)</b> HOOLEY ET AL.	
	<b>Examiner</b> JASON R. KURR	<b>Art Unit</b> 2614	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 16 September 2008.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 224-242 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 224-242 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)            | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | Paper No(s)/Mail Date. _____                                      |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>6/17/08 12/1/08</u> .   | 6) <input type="checkbox"/> Other: _____                          |

## **DETAILED ACTION**

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 224-242 are rejected under 35 U.S.C. 103(a) as being unpatentable over Greenberger (US 5,870,484) in view of Gorike (US 4,256,922) and in further view of Franssen et al (US 4,399,328).

With respect to claim 224, Greenberger discloses a method of causing plural input signals (fig.13a "L,R") representing respective channels to appear to emanate from respective different positions in space (col.3 ln.31-55), said method comprising: providing a sound reflective or resonant surface at each of said positions in space (fig.8a-d); providing an array of output transducers distal from positions in space (fig.13a "Not Labeled"); directing, using said array of output transducers, sound waves of each channel towards the respective position in space to cause said sound waves to be retransmitted by said reflective or resonant surface (col.3 ln.31-55); said step of directing comprising: obtaining, in respect of each transducer, a delayed replica of each input signal delayed by a respective delay (fig.13a "Delay") selected in accordance with the position in the array of the respective output transducer and said respective position in space such that the sound waves of the channel are directed towards the position in

space in respect of that channel (col.11 ln.16-67, col.12 ln.1-2); summing, in respect of each transducer, the respective delayed replicas of each input signal to produce an output signal (fig.13a "sum"); and routing the output signals to the respective transducers (fig.13a).

Greenberger does not disclose expressly wherein the array of speakers comprises at least 6 output transducers provided in one enclosure.

Franssen discloses a stereophonic speaker system wherein an array of at least 6 output transducers (fig.3 #21-27) in one enclosure (fig.3 #6) are supplied with an input signal (fig.3 #7) that is delayed to provide a directional acoustic output (col.1 ln.6-24). At the time of the invention it would have been obvious to a person of ordinary skill in the art use the array of Franssen in place of the array of Greenberger. The motivation for doing so would have been to provide a greater directionality in the reproduced signal by extending the number of elements in the array.

Greenberger does not disclose expressly wherein the replicas for transducers closer to the respective position in space are delayed more than replicas for transducers further from the position in space.

Gorike discloses a stereophonic speaker system wherein an array of output transducers (fig.3 #24-26) causes a plurality of input signals to appear to emanate from respective different positions in space such that signals for transducers closer to the respective position in space are delayed more than replicas for transducers further from the position in space (see Abstract, col.2 ln.18-36). At the time of the invention it would have been obvious to use the directive sound delay methods of Gorike on a transducer

by transducer basis in order to control the spatial sound reproduction with respect to the position of the array in a surrounding environment. The motivation for doing so would have been to account for the placement of the array in a non-symmetrical relationship with respect to the reflection walls of the room (Gorike: col.8 ln.6-15) such that the reproduced audio signal does not suffer from undesirable phase mismatches.

With respect to claim 225, Greenberger discloses a method according to claim 224, wherein said step of obtaining, in respect of each output transducer, a delayed replica of the input signal comprises: replicating said input signal to obtain a replica signal in respect of each output transducer (col.30 ln.35-39); delaying each replica of said input signal by said respective delay selected in accordance with the position in the array of the respective output transducer and said respective position in space (fig.13a “delay”, col.57 ln.60-67, col.58 ln.1-54).

With respect to claim 226, Greenberger discloses a method according to claim 224 further comprising: calculating, before said delaying step, the respective delays in respect of each input signal replica by: determining the distance between each output transducer and the position in space in respect of that input signal; deriving respective delay values such that the sound waves from each transducer for a single channel arrive at said position in space simultaneously (col.58 ln.39-54).

With respect to claim 227, Greenberger discloses a method according to claim 224 further comprising: inverting one of said plural input signals; obtaining, in respect of each output transducer, a delayed replica of said inverted input signal delayed by a respective delay selected in accordance with the position in the array of the respective

Art Unit: 2614

transducer, so that sound waves derived from said inverted input signal are directed at a position in space so as to cancel out at least partially sound waves derived from that input signal at that position in space (col.2 ln.36-54).

With respect to claim 228, Greenberger discloses a method according to claim 227, wherein said step of obtaining, in respect of each output transducer, a delayed replica of said inverted input signal comprises: replicating said inverted input signal to obtain a replica signal in respect of each output transducer (col.30 ln.35-39); delaying each replica of said inverted input signal by a respective predetermined delay selected in accordance with the position in the array of the respective output transducer (col.57 ln.60-67, col.58 ln.1-54).

With respect to claim 229, Greenberger discloses a method according to claim 227, wherein said inverted input signal is scaled so that the sound waves derived from said inverted input signal cancel sound waves derived from that input signal at said position in space (col.11 ln.19-37, col.14 ln.19-36).

With respect to claim 230, Greenberger discloses a method according to claim 229, wherein said scaling is selected by determining, in respect of the input signal which has been inverted, the magnitude of sound waves at said position in space and selecting said scaling so that sound waves derived from said inverted input signal have the same magnitude at that position (col.58 ln.1-4).

With respect to claim 231, Greenberger discloses a method according to claim 224, wherein at least one of said surfaces is provided by a wall of a room or other permanent structure (col.77 ln.42-60).

With respect to claim 232, Greenberger discloses an apparatus for causing plural input signals (fig.13a "L,R") representing respective channels to appear to emanate from respective different positions in space (col.3 ln.31-55), said apparatus comprising: a sound reflective or resonant surface at each of said positions in space (fig.8a-d); an array of output transducers distal from said positions in space (fig.13a "Not Labeled"); and a controller (fig.13a "Delay Spatial Control", "Level Spatial Control") for directing, using said array of output transducers, sound waves of each channel towards that channel's respective position in space such that said sound waves are re-transmitted by said reflective or resonant surface; said controller comprising replication (col.30 ln.35-39) and delay means (fig.13a "Delay") arranged to obtain, in respect of each transducer, a delayed replica of the input signal delayed by a respective delay selected in accordance with the position in the array of the respective output transducer and said respective position in space such that the sound waves of the channel are directed towards the position in space in respect of that input signal (col.57 ln.60-67, col.58 ln.1-54); adder means arranged to sum (fig.13a "sum"), in respect of each transducer, the respective delayed replicas of each input signal to produce an output signal; and means to route the output signals to the respective transducers such that the channel sound waves are directed towards the position in space in respect of that input signal (fig.13a).

Greenberger does not disclose expressly wherein the array of speakers comprises at least 6 output transducers provided in one enclosure.

Franssen discloses a stereophonic speaker system wherein an array of at least 6 output transducers (fig.3 #21-27) in one enclosure (fig.3 #6) are supplied with an input

Art Unit: 2614

signal (fig.3 #7) that is delayed to provide a directional acoustic output (col.1 ln.6-24).

At the time of the invention it would have been obvious to a person of ordinary skill in the art use the array of Franssen in place of the array of Greenberger. The motivation for doing so would have been to provide a greater directionality in the reproduced signal by extending the number of elements in the array.

Greenberger does not disclose expressly wherein the replicas for transducers closer to the respective position in space are delayed more than replicas for transducers further from the position in space.

Gorike discloses a stereophonic speaker system wherein an array of output transducers (fig.3 #24-26) causes a plurality of input signals to appear to emanate from respective different positions in space such that signals for transducers closer to the respective position in space are delayed more than replicas for transducers further from the position in space (see Abstract, col.2 ln.18-36). At the time of the invention it would have been obvious to use the directive sound delay methods of Gorike on a transducer by transducer basis in order to control the spatial sound reproduction with respect to the position of the array in a surrounding environment. The motivation for doing so would have been to account for the placement of the array in a non-symmetrical relationship with respect to the reflection walls of the room (Gorike: col.8 ln.6-15) such that the reproduced audio signal does not suffer from undesirable phase mismatches.

With respect to claim 233, Greenberger discloses an apparatus according to claim 232, wherein said controller further comprises: calculation means for calculating the respective delays in respect of each input signal replica by: determining the distance



Art Unit: 2614

between each output transducer and the position in space in respect of that input signal; deriving respective delay values such that the sound waves from each transducer for a single channel arrive at said position in space simultaneously (col.58 ln.39-54).

With respect to claim 234, Greenberger discloses an apparatus according to claim 232, wherein said controller further comprises: an inverter for inverting one of said plural input signals; second replication and delay means (fig.13a "Delay") arranged to obtain, in respect of each output transducer, a delayed replica of said inverted input signal delayed by a respective delay selected in accordance with the position in the array of the respective transducer and a second position in space so that sound waves derived from said inverted input signal are directed at said second position in space so as to cancel out at least partially sound waves derived from that input signal at said second position in space (col.2 ln.36-54). It is inherent that an inverter can be used to achieve a phase-inverted signal as does the cross talk canceller of Greenberger.

With respect to claim 235, Greenberger discloses an apparatus according to claim 234, wherein said controller further comprises a scaler (fig.13a "Level Spatial Control") for scaling said inverted input signal so that the sound waves derived from said inverted input signal substantially cancel sound waves derived from that input signal at said second position in space (col.58 ln.1-4).

With respect to claim 236, Greenberger discloses an apparatus according to claim 232, wherein said surfaces are reflective and have a roughness on the scale of a wavelength of sound frequency it is desired to diffusely reflect (fig.8a-d).

With respect to claim 237, Greenberger discloses an apparatus according to claim 232, however does not disclose expressly wherein said surfaces are optically-transparent.

At the time of the invention it would have been obvious to a person of ordinary skill in the art to include optically transparent windows in the walls of Greenberger.

The motivation for doing so would have been to allow a user to visibly see into an opposing room or to view the environment outside of the room.

With respect to claim 238, Greenberger discloses an apparatus according claim 233, wherein at least one of said surfaces is a wall of a room or other permanent structure (col.77 ln.42-60).

With respect to claim 239, Greenberger discloses an apparatus for causing plural input signals (fig.13a "R,L") representing respective channels to appear to emanate from respective different positions in space (col.3 ln.31-55), said apparatus comprising: an array of output transducers distal from said positions in space (fig.13a "Not Labeled"); and a controller (fig.13a "Delay Spatial Control", "Level Spatial Control") for directing, using said array of output transducers, sound waves of each channel towards that channel's respective position in space such that said sound waves are retransmitted by said reflective or resonant surface (col.3 ln.31-55); said controller comprising: replication (col.30 ln.35-39) and delay means (fig.13a "Delay") arranged to obtain, in respect of each transducer, a delayed replica of the input signal delayed by a respective delay selected in accordance with the position in the array of the respective output transducer and said respective position in space such that the sound waves of

Art Unit: 2614

the channel are directed towards the position in space in respect of that input signal (col.57 ln.60-67, co.58 ln.1-54); adder means arranged to sum (fig.13a "sum"), in respect of each transducer, the respective delayed replicas of each input signal to produce an output signal; and means to route the output signals to the respective transducers such that the channel sound waves are directed towards the position in space in respect of that input signal (fig.13a).

Greenberger does not disclose expressly wherein the array of speakers comprises at least 6 output transducers provided in one enclosure.

Franssen discloses a stereophonic speaker system wherein an array of at least 6 output transducers (fig.3 #21-27) in one enclosure (fig.3 #6) are supplied with an input signal (fig.3 #7) that is delayed to provide a directional acoustic output (col.1 ln.6-24). At the time of the invention it would have been obvious to a person of ordinary skill in the art use the array of Franssen in place of the array of Greenberger. The motivation for doing so would have been to provide a greater directionality in the reproduced signal by extending the number of elements in the array.

Greenberger does not disclose expressly wherein the replicas for transducers closer to the respective position in space are delayed more than replicas for transducers further from the position in space.

Gorike discloses a stereophonic speaker system wherein an array of output transducers (fig.3 #24-26) causes a plurality of input signals to appear to emanate from respective different positions in space such that signals for transducers closer to the respective position in space are delayed more than replicas for transducers further from

Art Unit: 2614

the position in space (see Abstract, col.2 ln.18-36). At the time of the invention it would have been obvious to use the directive sound delay methods of Gorike on a transducer by transducer basis in order to control the spatial sound reproduction with respect to the position of the array in a surrounding environment. The motivation for doing so would have been to account for the placement of the array in a non-symmetrical relationship with respect to the reflection walls of the room (Gorike: col.8 ln.6-15) such that the reproduced audio signal does not suffer from undesirable phase mismatches.

With respect to claim 240, Greenberger discloses an apparatus according to claim 239, wherein said controller further comprises: calculation means for calculating the respective delays in respect of each input signal replica by: determining the distance between each output transducer and the position in space in respect of that input signal; deriving respective delay values such that the sound waves from each transducer for a single channel arrive at said position in space simultaneously (col.58 ln.39-54).

With respect to claim 241, Greenberger discloses an apparatus according to claim 239, wherein said controller further comprises: an inverter for inverting one of said plural input signals; second replication (col.30 ln.35-39) and delay means (fig.13a "Delay") arranged to obtain, in respect of each output transducer, a delayed replica of said inverted input signal delayed by a respective delay selected in accordance with the position in the array of the respective transducer and a second position in space so that sound waves derived from said inverted input signal are directed at said second position in space so as to cancel out at least partially sound waves derived from that input signal at said second position in space (col.2 ln.36-54). It is inherent that an inverter can be

Art Unit: 2614

used to achieve a phase-inverted signal as does the cross talk cancellation disclosed by Greenberger.

With respect to claim 242, Greenberger discloses an apparatus according to claim 241, wherein said controller further comprises: an inverter for inverting one of said plural input signals; second replication (col.30 ln.35-39) and delay means (fig.13a "Delay") arranged to obtain, in respect of each output transducer, a delayed replica of said inverted input signal delayed by a respective delay selected in accordance with the position in the array of the respective transducer and a second position in space so that sound waves derived from said inverted input signal are directed at said second position in space so as to cancel out at least partially sound waves derived from that input signal at said second position in space (col.2 ln.36-54). It is inherent that an inverter can be used to achieve a phase-inverted signal as does the cross talk cancellation disclosed by Greenberger.

### ***Response to Arguments***

Applicant's arguments with respect to claims 224, 232 and 239 have been considered but are moot in view of the new ground(s) of rejection.

### ***Conclusion***

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Ferren (US 5,802,190) discloses a linear speaker array.

Yamamuro et al (US 4,472,834) discloses a loudspeaker system.

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to JASON R. KURR whose telephone number is (571)272-0552. The examiner can normally be reached on M-F 10:00am to 6:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Vivian Chin can be reached on (571) 273-7848. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 2614

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/Jason R Kurr/

Examiner, Art Unit 2614

/Xu Mei/

Primary Examiner, Art Unit 2614